IMPERIAL BUREAU
29 SEP 1930
OF MYCOLOGY

British Guiana.

ADMINISTRATION REPORT

OF THE

DIRECTOR OF AGRICULTURE,

FOR THE YEAR

1929.

GEORGETOWN, DEMERARA:
PRINTERS TO THE GOVERNMENT OF BRITISH GUIANA
"THE ARGOSY" COMPANY, LIMITED.
1930.

DEPARTMENT OF AGRICULTURE.

Head Office.

Director of Agriculture	...Prof. the Hon. J. Sydney Dash, B.S.A. (McGill)
Deputy Director..	...F. Burnett, M.C., M.A. (Oxon).

District Agricultural Superintendents.

East Demerara	...E. M. Peterkin.
North West District	...E. Beckett, F.L.S.
Essequibo	...A. DeK. Frampton, C.D.A.
West Demerara	...J. D. Gillespie, B.Sc. (Edin.).
Berbice	...H. Macluskie, U.D.A. (Aberdeen).
Essequibo (Assistant Agricultural Superintendent)	...A. A. Abraham.
Demerara (Assistant Agricultural Superintendent)	...H. D. Huggins, D.I.C.T.A.

Research—(Laboratories).

Entomologist	...L. D. Cleare, Jnr., F.L.S., F.E.S.
Botanist and Mycologist	..E. B. Martyn, B.A. (Oxon).
Chemist-Ecologist	...R. R. Follett-Smith, B.Sc., A.R.C.S.
Assistant Chemist	...C. L. C. Bourne.

Research—(Field Experiment Stations).

Live Stock Farm, Georgetown—(Veterinary Surgeon)	...T. Bone, O.B.E., M.R.C.V.S.
Experiment Station (Sugar), Sophia—(Cane Agronomist)	...C. H. B. Williams, D.I.C.T.A.
Experiment Station, Georgetown	E. M. Peterkin.
Experiment Station, Cecilia	E. M. Peterkin.
Experiment Station, Hosororo, N.W.D.	...E. Beckett, F.L.S.
Experiment Station, Henrietta, Essequibo	A. DeK. Frampton, C.D.A.
Bush Lot Land Settlement Scheme	A. DeK. Frampton, C.D.A.

Botanic Gardens.

Superintendent in Charge	...E. B. Martyn, B.A. (Oxon).
Horticultural Assistant	...H. A. Cole.

Agricultural Instructors.

Resident Instructor, Berbice	...E. M. Morgan.
Resident Instructor, East Demerara	...C. C. Dowding.
Assistant Instructor, Essequibo Islands	...J. E. Wilson.
Assistant Instructor, East Demerara	...D. D. Haynes.

Agricultural Assistants.

Experiment Station, Demerara	...Indrobeharry.
Experiment Station, Essequibo	...H. B. France.

Laboratory Assistants.

Meteorological Observer	...D. D. Blackman.
Entomological Assistant	...C. Williams.
Botanical and Mycological Assistant	...N. Persaud.

Clerical Staff.

Senior Clerk, Head Office	...J. F. Irving, M.C.
Accountant, Head Office	...J. A. V. Bourne.
Librarian, Head Office	...E. L. N. Boston.
Clerks, Head Office	...J. Pestano, O. Bardon, D. M. Terrill, M. Cheong.
Clerk, Botanic Gardens	...G. L. Leitch.

Sugar Experiment Stations.

Committee.

Director of Agriculture, Chairman, *ex-officio*.

Mr. G. Anderson	...Pln. Diamond, E.B.	Representing the British Guiana Sugar Producers' Association.
„ A. E. Craig	...Pln. Ogle, E.C.	
„ J. C. Gibson	...Pln. Port Mourant	
„ C. Farrar	...New Amsterdam	
„ A. Murison	...Pln. Uitvlugt, W.C.	
Hon. R. E. Brassington	.. Georgetown	

Staff.

Agronomist	...C. H. B. Williams, D.I.C.T.A.
Field Manager	...C. Cameron.
Laboratory Assistant	...L. A. Robinson.
Field Assistant	...L. A. Forte.
Clerical Assistant	...J. B. Bourne.

In collaboration with the Officers of the Department of Agriculture.

Note.—The above is the Staff List for 1930.

C.S.O. No. 4218/30.

British Guiana.

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REPORT OF THE DEPARTMENT OF AGRICULTURE FOR THE YEAR 1929.

TABLE OF CONTENTS.

	Page.
Staff	1
Expenditure	2
Meteorology	2
Principal Crops	3
Minor Industries	7
Census Returns	8
Colonization and Land Settlement	9
Agricultural Investigations	9
Entomological Investigations	16
Botanical and Mycological Investigations	17
Soil Investigations	18
Special Investigations...	19
Agricultural Education and Extension	22
Livestock	23
Botanic Gardens and Nurseries	25
Seed and Plant Distribution	25
Seed and Plant Exchange	26
Publications	26
General Remarks	27

REPORT ON THE DEPARTMENT OF AGRICULTURE FOR THE YEAR 1929.

I have the honour to submit the following administrative report on the work of this Department for the year 1929. The Divisional Reports in full will be published in the Agricultural Journal in accordance with the policy adopted last year.

STAFF.

2. Mr. R. R. Follett-Smith, B.Sc. (London), A.R.C.S., arrived in the Colony on April 2, and assumed his duties as Chemist-Ecologist on that date.

Mr. C. H. B. Williams, D.I.C.T.A., lately Director, Station Agronomique, Point-a-Pitre, Guadeloupe, arrived in the Colony on May 14 and assumed his duties as Sugar Cane Agronomist in charge of the Sugar Experiment Station, Georgetown.

Mr. L. D. Cleare, F.L.S., F.E.S., Government Entomologist, was appointed to act as Deputy Director of Agriculture from March 21, 1929, to the end of the year.

Mr. J. F. Irving, M.C., Senior Clerk, left the Colony on 6 months' leave of absence on January 18, 1929. On his return in July, he was seconded for duty to the Immigration Department.

Mr. H. Haydock-Wilson, of the Colonial Secretariat, acted as Senior Clerk during the absence of Mr. Irving.

Mr. E. M. Peterkin, Agricultural Superintendent, Demerara, left the Colony on 4 months' leave of absence on April 10. Mr. H. D. Huggins, Assistant Superintendent, was in charge of the Agricultural Station, Demerara, during the absence of Mr. Peterkin.

Professor J. Sydney Dash, B.S.A., Director of Agriculture, left the Colony on July 15 for Canada on a trade mission with special reference to the Rice Industry of the Colony.

Mr. L. D. Cleare, F.L.S., F.E.S., was appointed to act as Director of Agriculture during the absence from the Colony of Professor Dash.

Mr. A. deK. Frampton, C.D.A., arrived in the Colony on October 1 and was appointed to the post of Agricultural Superintendent, Essequibo.

Mr. R. R. Pasea, District Agricultural Instructor, died on March 21.

Mr. F. Burnett, M.C., M.A. (Oxon.), Divisional Agricultural Officer on the staff of the Ceylon Department of Agriculture accepted the post of Deputy Director of Agriculture of this Colony, and is expected to arrive here early in 1930.

During the year the Department was short staffed, notably in respect to a Deputy Director and District Agricultural Officers, while administrative work at Headquarters increased to such an extent as to make it at times difficult for the clerical staff to cope with.

EXPENDITURE.

3. The total vote assigned to the Department by the Legislature at its Session in 1928 for the year 1929 was $97,115. The following expenditure was voted on Supplementary Estimates during the year 1929 to be met from savings on Departmental Sub-votes :—

$ 182 00—Passage of Chemist-Ecologist to the Colony.
$1,800 00—Special Mission to Canada of the Director of Agriculture.
$1,170 00—Passage of Officers to the Colony on first appointment.
$ 634 00—Purchase of Platinum Ware.
$ 215 00—Visit of Deputy Director to Rice Experiment Station, Italy.

4. At December 31, there was an unexpected balance of $3,137.84 as shown in the following Table :—

TABLE I.

ANNUAL ESTIMATES.

No. of Sub-vote.	Sub-vote.	Balances Unexpended.	Excess Expenditure.
1-26 ...	Personal Emoluments—Fixed and Unfixed	$ 4,691 82	
	OTHER CHARGES.		
27-28 ...	Travelling Expenses	58 06	
29 ...	Library and Publications	1 09	
30-35, 49...	General Expenses	109 00	
36 ...	Provision and Maintenance of Scientific Apparatus and Equipment ...	...	$ 146 59
37, 38, 39 & 56 ...	Botanic Gardens and Government House Grounds	111 30	
40 ...	Berbice Public Gardens	207 62	
41 ...	Purchase, Production and Distribution of Seeds and Plants	36 12	
42-46 ...	Experiment Stations, Demerara, Essquebo, North West District and Pomeroon ...	369 67	
47 ...	Live Stock—Purchase and Maintenance of	10 72	
48 ...	Cutting Grass for Police Horses	23 35	
50 ...	Grants-in-aid for Exhibitions, &c.	788 06	
51 ...	Subsidies to Agricultural Instructors	652 58	
52 ...	Agricultural Apprentices	14 05	
53-54 ...	Veterinary and Plant Pest Preventive Measures	45 29	
55 ...	Contingencies	166 94	
..	Passage of Chemist-Ecologist to the Colony	...	181 20
...	Passages of Officers to the Colony on first appointment	...	1,322 64
...	Special mission to Canada of the Director of Agriculture	...	1,644 50
...	Purchase of Platinum Ware	...	637 92
...	Visit of Deputy Director to Rice Experiment Station, Italy	...	214 98
	TOTAL	$ 7,285 67	$ 4,147 83

5. The payments into the Treasury during the year were as follows :—

Agricultural Stations	$1,951 91
Botanical Gardens, Economic and Ornamental Plants	656 08
Sale of Official Publications	103 41
	$2,711 40

METEOROLOGY.

6. The following are abstracts of the Meteorological observations recorded at the Botanic Gardens, Georgetown, and at the Penal Settlement, Mazaruni, during 1929 :—

Meridian of longitude for calculation of time adopted as standard in the Colony	60° W.
Hours slow of Greenwich time	3.45

Georgetown.

7. The meteorological station is situated in the Botanic Gardens at a distance of 1.45 miles south of the coast-line. The hours of observation are 7 a.m., and 1 and 6 p.m., local official time which is 3.45 hours behind Greenwich time. The height of the barometer is 6 feet 6 inches above the mean sea-level.

8. During the year 1929, the air temperature in the shade for the months of January, March, June, July and December, was lower than the means recorded over the period 1846-1928. The highest temperature recorded was 90.0° F. on October 18, while the lowest was 70.0° F. on the night of October 20. The mean shade temperature for the year was 80.1° F. or 0.3° lower than the average from 1846-1928. The total rainfall was 71.62 inches, as compared with 96.48 inches in the year 1928 and with 88.64 inches for the period 1880-1928. The total rainfall from January to April inclusive was 19.23 inches as compared with 34.19 inches in 1928. Heavy rains were experienced in the months of May and June. For the months of July to December inclusive the total rainfall was 27.14 inches or 13.33 inches below normal. The evaporation from a free water surface, a six feet square tank at the ground level, was 61.98 inches as compared with a normal evaporation of 57.90 inches; the evaporation for 1928 being 86.54% of the total rainfall. The total amount of bright sunshine for the year was 2474.4 hours as compared with 2461.6 hours in 1928 and with 2364.5 hours in 1927 and was 16.7 hours above the average from 1846-1928. The mean radiation temperature (blackened bulb in vacuo) was 5° higher than normal and 0.7° higher than that of the previous year, the maximum monthly record during the year being 151.9° for October, while the highest daily record 159.0° occurred on October 10. The mean minimum temperature on grass was 0.7° higher than the average. The mean velocity of wind was 7.08 miles per hour, the maximum velocity being 18.75 miles per hour. The anemograph recorded a gale travelling at the rate of 39 miles per hour at 2.50 p.m., on Friday, July 5. There was an earth tremor at midnight on October 19.

Mazaruni.

9. A sub-station established at the Penal Settlement, Mazaruni River, is in longitude 58° 38′ 45″ W. and latitude 6° 23′ 35″ N. at a distance of 42 miles south of the coast-line. The hours of observation are the same as at the main station in Georgetown. The height of the Barometer is 53 feet above mean sea level.

10. During 1929 the mean air temperature in the shade was 77.8° F., the maximum temperature recorded being 91.0° on September 23, while the minimum 69° occurred on January 18 and 27 as well as on 5 nights in February, 2 in March, 2 in April and 3 in December. The total rainfall was 98.5 inches or 2.05 inches higher than that of the previous year. The general distribution of the rainfall was far in excess to that of Georgetown, except that during the month of February 1.62 inches less of rain fell at Mazaruni than in Georgetown. The total rainfall for the year was 29.96 inches higher than that at Georgetown. Rain fell on 232 days in the year as compared with 196 in Georgetown. The total amount of bright sunshine recorded during the year was 1,847.8 hours as compared with 2,474.4 hours at Georgetown.

PRINCIPAL CROPS.

Sugar.

11. The total area in sugar cultivation in the Colony during the year 1929 was 57,247 English acres as against 57,625 acres for 1928. The yield was equivalent to over 2 tons per acre. The area reaped, as shown by the census returns, amounted to 56,126 acres yielding 117,254 tons sugar, while the export was 100,449 tons; as against the figures for 1928 of 116,484 tons produced from 53,489 acres, with an export for that year of 114,687 tons. The rum produced was 1,838,353 gallons of which 1,109,482 gallons were exported, as against an export of 1,269,923 gallons in 1928. The export of molasses was 2,536,623 gallons. With regard to cattle food, 1,803 tons of molascuit were exported. As in previous years the variety of sugar cane mostly grown in the Colony is D 625; there are also small areas of B.H. 10 (12), Diamond 10, Diamond 37, D. 118, D. 145, D. 109 and R.P. 8, while several of the newer varieties raised at the Sugar Experiment Station are receiving attention in estate nurseries with a view to extension and trial on a larger scale.

12. Table II. shows the acreage, production and exports under this crop from 1919 to 1929. It is interesting to observe that while the area under cultivation has considerably decreased in recent years, production has been steadily maintained, and actually shows a noteworthy increase. As the principal variety cultivated remains the same, improvements in tillage and field management—in some cases extended practice of the water fallow system (keeping old cane fields under water for some months before replanting)—would appear largely responsible for the increased yield of sugar per acre being obtained. Low prices again prevailed ; nevertheless the general fact emerges that the status of the industry, based on output, remains unimpaired, providing ample proof of the suitability of this industry to the Colony.

13. During the past two years the economic condition of the sugar industry has become very acute, resulting in the recent Commission of enquiry headed by Lord Olivier. The following statement shows the quantity and value of sugar exported for the past 10 years :—

Year.	Tons of Sugar Exported.	Value in Dollars.
1920	83,765	$ 20,126,316
1921	108,270	10,099,891
1922	90,571	7,175,169
1923	83,167	10,237,450
1924	85,896	8,482,200
1925	97,728	6,785,740
1926	84,659	6,050,257
1927	109,616	8,787,585
1928	114,687	8,124,666
1929	100 449	5,943,788

Table II.

SUGAR.

Year.	Sugar Cane acreage.	Tonnage of Sugar produced.	Tonnage of Sugar exported.	Rum produced proof gallons.	Rum exported proof gallons.	Molasses exported in gallons.	Molascuit exported in tons.
1919 ...	70,876	86,971	83 139	3,464,403	4,342,769	171,249	2,023
1920 ...	69,532	87,186	83,765	2 810,685	1,772,178	420	1,783
1921 ...	63,420	110,985	108,270	1,806,651	2,228,164	204	1,707
1922 ...	60,761	101,128	90,570	520,141	422,168	76 574	1,072
1923 ...	57,814	90,758	83,166	1,180,072	420,996	65,997	814
1924 ...	57,190	91,782	85,896	2,077,619	769,304	1,160,757	1,102
1925 ...	57,500	107,580	97,728	1,277,900	1,148,124	1,345.243	1,268
1926 ...	58,589	98,152	84,659	1,622,966	789,643	2,017,862	1,075
1927 ...	59,271	114,030	109,616	1,436,010	1,081,120	2.677,457	977
1928 ...	57,625	116,484	114,687	1,745,293	1,269 923	2,873,468	2,082
1929 ...	57,247	117,254	100,449	1,838,353	1,109,482	2,536,623	1,803

Rice.

14. The area occupied by this cereal during 1929 was returned as 52,989 acres, but including the second crop the area actually reaped was 63,441 acres. The yield was returned as 1,113,757 bags of 145 lbs. padi, equivalent to a yield of 17½ bags padi per acre.

15. The amount of rice exported was 14,091 tons with a value of $876,407 as against 18,083 tons with a value of $1,114,147 for 1928.

16. During the year the West Indian market for rice became somewhat disorganised owing to large importations from India ; nevertheless, the industry as a whole is receiving more serious attention on the part of those engaged in it than hitherto. The increasing use of selected seed together with the improved methods contemplated in regard to grading and marketing should result in better yields and more stabilized prices in the future.

17. New avenues for the export of this cereal are being eagerly sought, especially as a result of the trade mission to Canada undertaken by the Director of Agriculture. There appear to be opportunities in the Dominion for padi or rough rice, now imported by the Canadian Mills from British and foreign sources in the East and elsewhere. A limited demand for high quality parboiled rice also exists

in Canada provided the quality is dependable and supplies regular. In addition, a wide marketing field, as yet untouched, exists in the more distant and populous islands of the Caribbean group.

18. The difficulties connected with the industrial side of the industry are well-known and do not need repetition here. It is expected that the visit of Mr. C. E. Douglas, who was specially sent by the Empire Marketing Board to report on this phase of the industry, will be of considerable assistance. The fullest co-operation of grower, miller and merchant, working in close collaboration with the Department of Agriculture is essential if this valuable and growing industry is to be guided aright.

19. The following Table gives particulars of rice production and values for the past seven years :—

TABLE III.

Period.	Mean Rainfall Coastal Stations Calendar Year.	Areas under rice cultivation. British Acres reaped.				Yields.			Exports.	
		Berbice.	Demerara.	Essequibo.		British Guiana total acreage (reaped).	Padi tons.	Rice, tons (60% yield of cleaned Rice from Padi)	Rice.	
				Mainland	Islands				Tons exported	Value in dollars
1923 ...	80·9	16,460	10,824	7,010	4,421	38,715	33,270	19,962	3,971	273,687
1924 ...	83·54	17,196	10,978	7,383	4,715	40,272	42,100	25,260	4,470	312,567
1925 ..	63·25	16,524	10,093	8,655	4,618	39,890	38,403	23,042	6,918	523,964
1926 ...	74·76	23,871	10,920	9,351	5,303	49,445	49,899	29,939	2,914	218,146
1927 ...	118·63	19,184	13,788	12,585	4,870	50,427	59,748	35,848	11,497	723,871
1928 ...	96·48	20,938	17,002	11,744	5,876	55,560	61,144	36,686	18,083	1,114,147
1929 ...	71·62	26,729	19,927	10,477	6,308	63,441	72,096	43,257	14.091	876,407

Coconuts.

20. The area under coconut palms in 1929 has not changed. The exports for 1929 were as follows :—coconuts—637,812 valued at $10,614 ; coconut oil—20,862 gallons, valued at $16,730 ; and copra—75,180 cwts. valued at $314,350.

21. The wilt disease of coconuts has been observed in several districts where the palms, planted upon stiff clay soils, have received little attention culturally.

22. The following table gives particulars of the industry for the years 1923 to 1929. The statistics as regards the acreage in this crop must be considered unsatisfactory. In the first place, it is difficult, from the usual figures supplied, to state definitely the areas in palms of different ages ; while many of the younger plantations are now bearing, a considerable number of the older palms established on unsuitable soils are suffering from root troubles and other ailments associated with bad drainage and general neglect. A careful survey of the whole industry from an agricultural point of view is essential if a correct appreciation of the problems pertaining to the industry is to be obtained. There are not inconsiderable areas of sand reef soils throughout the country which would permit of the profitable extension of this crop. Agriculturally, little attention is paid to the palms—the yield of nuts per tree on the average being low—and until the Department of Agriculture is provided with facilities for demonstrating how a coconut plantation should be established and maintained on sound economic lines, the industry is not likely to make rapid progress.

23. There is also much to be done in connexion with the preparation and disposal of copra, the product at present being anything but uniform in quality. It will be observed that the export of whole nuts has materially decreased, the bulk of the nuts produced locally being undersized for this particular trade. One large commercial firm is considering the establishment of an oil plant locally. This will be a great boon to the small cultivator. As a concession, the Legislative Council (see Governor's Message No. 19 of 1928) has decreed that no excise duty on coconut oil and other vegetable oils shall be collected for a period of 25 years.

TABLE IV.

COCONUTS, COPRA AND COCONUT OIL.

Periods.	No. of Acres (British) under cultivation.	No. Exported to nearest hundred.	Value in Dollars.	Copra, lbs.	Value in Dollars.	Coconut Oil, gallons.	Value in Dollars.
1923	22,970	2,659,000	...	941,000	...	26,621	...
1924	25,201	1,559,800	24,413	1,848,896	71,495	21,804	17,443
1925	29,879	1,363,280	34,293	1,935,110	96,110	20,394	30,394
1926	26,502	816,000	18,727	3,820,432	190,055	18,778	18,590
1927	27,790	334,000	6,015	2,605,818	116,525	25,326	25,326
1928	28,000	322,000	5,944	7,841,904	352,522	26,244	26,206
1929	28,000	637,812	10,614	8,420,160	314,350	20,862	16,730

Coffee.

24. The acreage under this crop during 1929, according to figures furnished the Department is 5,905 acres. The exports were 907,026 lbs. valued at $104,135 as against 919,772 lbs. valued at $137,933 in 1928.

25. The area under cultivation is gradually being extended chiefly on the pegasse lands of the Pomeroon, the North West District and Nos. 1 and 2 Canals Polder District. The exports in the last two years materially increased and the industry is, in spite of world overproduction, of definite though limited value. The troubles of the local industry centre mainly around preparation of the product for market. Given improved facilities, which can be obtained among small growers only by co-operative methods fostered by Government aid, a high quality Liberian coffee can be produced, which can be sold in limited quantities in the Canadian and European markets. At present the bulk of this coffee is low grade and goes principally to Scandinavian markets.

26. Successful efforts were made in the North West during the year to secure the co-operation of Messrs. Garnett & Co. in the preparation of small farmers' coffee, but the firm's drying plant is too small for their own requirements and the needs of the district as well. On the other hand, the experience so far has been that farmers are not inclined to patronize the drier when the weather is favourable to open air drying. This, of course, means that the product as now turned out is lacking in uniformity and this applies to all coffee produced in the Colony.

27. In recent years, a disease of the berry and leaf has caused some apprehension in the North West District. This is being thoroughly investigated with a view to control by the Department. The disease may result in substantial losses in years of excessive humidity.

TABLE V.

Periods.	No. of Acres (British) under Cultivation.	Coffee Exported, lbs.	Value in Dollars.
1914-1918 ...	4,713	342,190	
1919 ...	5,125	936,540	
1920 ...	5,032	407,900	
1921 ...	5,030	405,104	
1922 ...	4,240	808,640	
1923 ...	3,916	535,136	
1924 ...	5,735	513,115 ...	56,075
1925 ...	6,243	668,029 ...	114,593
1926 ...	5,226	773,257 ...	132,623
1927 ...	5,272	430,543 ...	68,844
1928 ...	5,894	919,772 ...	137,933
1929 ...	5,905	907,026 ...	104,135

Para Rubber and Balata.

28. The area returned under Para Rubber is 1,400 acres. The actual area is much greater than this but owing to the low price of rubber and the presence of the endemic leaf disease large areas are no longer considered in the returns. The export for 1929 was 15 cwts. as against 143 cwts. in 1928.

29. The export of balata (*Mimusops Globosa*) was 5,356 cwts. valued at $231,651 as against 5,782 cwts. valued at $257,448 in 1928.

It is regrettable that this industry should also be experiencing a severe crisis at the present time. Since 1925 when the Colony exported 8,078 cwts. valued at $543,033, there has been a marked decline. New uses for balata are greatly needed ; at present it suffers from competition with rubber in the manufacture of beltings, shoe soles, &c.

MINOR INDUSTRIES.

30. *Cocoa.*—During the past 10 years the acreage under this crop has diminished due largely to the inroads of witch broom disease, which, unless carefully watched, spreads rapidly resulting in depleted yields and debilitated trees. Under present conditions little hope can be held out that the industry will ever assume any importance in the Colony.

TABLE VI.

Periods.	No. of Acres (British) under cultivation.	Cacao exported. lbs.	Raw Cacao and prepared Cacao imported. lbs.
1904–1908 ...	1,940	73,100	20,590
1909–1913 ...	2,140	54,500	20,970
1914–1918 ...	2,114	34,670	54,020
1919 ...	2,147	9,520	102,580
1920–1922 ...	2,020	(1920) 24,192	(1920) 179,120
1923 ...	1,903	none	189,063
1924 ...	1,918	,,	188,373
1925 ...	1,918	,,	218,306
1926 ...	1,287	,,	174,085
1927 ...	1,256	,,	166,539
1928 ...	1,202	,,	153,760
1929 ...	1,488	,,	123,972

31. *Limes and other Citrus.*—The lime industry has shown a steady decline in acreage. Messrs. Davson & Co., of Berbice, have been carrying on the industry for many years. As is well known the market for lime products fluctuates considerably. It is possible that the sand reefs of the coastal belt would prove suitable to this crop. In recent years the wither tip disease has attacked the trees and there are only small areas here and there where there has been resistance to the disease. At the present time the hill lands of the North West District would appear to be the part of the Colony best suited to lime cultivation and there has been, recently, with the high prices ruling for lime oil, a resuscitation of interest in the industry there. A lime factory has been erected by one enterprising planter in the district who has reclaimed an area of 70 acres of semi-abandoned lime cultivation. In addition, limes have been purchased at $1.20 per barrel from small farmers for the manufacture of lime oil, and concentrated lime juice. The Government plantations at Onderneeming on the Essequibo Coast while still in existence, are rapidly deteriorating.

32. The Department is giving much attention to citrus growing in the North West. During the last two years ten acres of selected budded grapefruit and oranges have been planted. The Station at Hosororo has been completely re-organised and experiments with limes, spices, insecticides, etc., put down. It is felt that should future soil surveys indicate suitable land in the Colony where citrus on a large scale can be planted, a supply of plant material will be available from the plants which have been established at this Station. Large numbers of stock plants are being grown in the Department's nurseries for the budding of citrus plants for distribution, primarily with the view of supplying local requirements for fruit which are now met almost entirely from the neighbouring colonies.

Table VII.

LIMES.

Years.	Acreage planted in limes.	Export of concentrated Lime juice in gallons.	Export of essential oil of limes in gallons.
1919	1,335	10,238	326
1920	1,058	6,001	484
1921	1,102	4,175	544
1922	660	11,156	634
1923	800	11,019	218
1924	711	9,785	396
1925	655	8,430	306
1926	655	4,974	277
1927	669	5,249	273
1928	660	8,124	440
1929	603	12,717	801

33. *Ground Provisions.*—Plantains, bananas, cassava, corn and ground provisions are said to occupy 13,577 acres. In spite of the decrease which has taken place in the area under these crops it is safe to say that the Colony as a whole, is very well supplied with the staple articles of diet for the labouring population, the main shortage being in peas and beans, these being less hardy under local conditions than plantains, cassava and root crops generally. As in other countries, there are periods of glut and periods of diminished supply, but at no time is there any actual scarcity of the more important ground provisions. The difficulty is to dispose of the available surplus. Marketing methods are faulty owing to the fact that the farmer is often in the hands of the local shopkeeper or a selling agent in Georgetown. The marketing and distribution of food crops locally require a careful and complete investigation. A start is being made by the Department, which is badly handicapped through lack of a whole-time marketing officer, to study the problem in the hope that, when financial assistance is available to the farmer, an improved system of disposal of these crops may emerge.

34. Practically, the only vegetable crop exported is the plantain and recently there has been increased activity in the shipment of this commodity to the Caribbean markets. A large proprietor on the East Coast, Demerara, has about 1,500 acres of this crop in one block, grown by peasants on rented land.

35. *Miscellaneous.*—Ground-nuts, soya beams, tobacco, onions, tomatoes, pulses, fibres and other economic crop plants continue to receive the Department's attention. The Divisional Reports will contain a full account of the Department's activities in respect to these miscellaneous trials. Orders for onion seed are increasing, and excellent specimens of onions were grown for which remunerative prices were realised by those who carried out the advice of the Department.

36. It would appear that increasing attention is being given, among city dwellers particularly, to home gardening and a regular demand for vegetable seed is gradually developing. Importers of seed in packets should consult the Department for information in respect to the best varieties.

CENSUS RETURNS.

37. The following tables show the number of acres under cultivation in 1929 in the three counties of the colony and also summaries for the past 12 years :—

Table VIII.

Counties.	Nature of Crops and number of Acres at 31st December, 1929.							
	Canes.	Rice.	Coconuts.	Cacao.	Coffee.	Rubber.	Limes.	Ground Provisions.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Berbice ...	20,164	26,729	6,922	166	200	225	400	3,418
Demerara ...	35,568	15,709	14,078	1,106	3,000	1,023	60	7,000
Essequibo ...	1,515	10,551	7,000	166	2,705	152	143	3,159
Total ...	57,247	52,989	28,000	1,438	5,905	1,400	603	13,577

Table IX.

	Year.	Annual Summaries of the Acreages under cultivation during the years 1913, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928 and 1929.								
		Sugar Cane.	Rice.	Coconuts.	Cacao.	Coffee.	Rubber.	Limes.	Maize, Plantains, etc., and Ground Provisions.	Total area under cultivation.
British Guiana ...	1913	72,685	33,889	14 177	1,863	3,166	4,018	941	17,580	148,319
do ...	1918	73,565	60,432	25,882	1,997	5,158	3,981	1,351	21,959	194,325
do ...	1919	70,876	61,200	25,882	2,147	5,125	4,042	1,335	18,192	188,999
do ..	1920	69,532	55,246	24,453	1,816	5,052	2,813	1,058	16,583	176,853
do ...	1921	63,420	55,911	26 321	1,176	5,030	2,813	1,102	16,378	172,151
do ..	1922	60,761	49,073	26,603	1,371	4 241	2,333	660	12.930	157,772
do ...	1923	57,814	34,965	22 970	1,903	4.096	2,080	800	11,924	136,552
do ...	1924	57,190	29,406	25,201	1,918	5,765	1,655	711	14,444	136,290
do ...	1925	57,500	29,333	29,979	1,918	6 243	2,200	655	11,715	139,543
do ...	1926	58,589	32,798	26,502	1,287	5,226	2,000	655	14,509	141,566
do ...	1927	59,271	37,340	27,780	1,356	5,272	1,800	669	13,355	147.353
do ..	1928	57,625	44,359	28,000	1,202	5,894	1,600	660	15,528	154,868
do ...	1929	57,247	52,989	28,000	1.438	5.905	1,400	603	13,577	161,159

COLONIZATION AND LAND SETTLEMENT.

38. During the year, the following important schemes relating to Colonization and Land Settlement in the Colony were undertaken in accordance with Government's Colonization and Land Settlement policy for relieving the present lack of population :—

North West District—Investigation into Suitability for Colonization.
Bush Lot, Essequibo District—Investigation and Preparation for a Land Settlement of *100 Families of East Indian Descent.

39. A Committee, consisting of the Director of Agriculture and Chief Colonization Officer (Chairman), Conservator of Forests, the Commissioner of Lands and Mines, the Commissioner, North West District, was formed to advise Government with regard to the investigation and preparation of all experimental land settlements. Fifteen meetings were held during the year, and the details of these Schemes occupied much time and necessitated careful supervision. The Chairman of the Committee was made responsible to Government for the efficient carrying out of all operations and expenditure in relation thereto.

40. Particulars of the North West District reconnaissance and soil survey as well as the Essequibo Land Settlement Scheme and the expenditure on the works undertaken are given in the special report of the Chief Colonization Officer, issued separately (C.S.O. file No. 1219/30).

AGRICULTURAL INVESTIGATIONS.

Sugar Experiment Station, Sophia.

41. The re-organisation of the Station during last year has resulted in a considerable amount of new experimental work being undertaken. There have also been essential additions to general equipment including a new seedling nursery ; a driving road into the station ; a car shed ; concrete paths, etc. The Agronomist assumed duties on May 16.

42. The work with varieties at Sophia may be considered under three heads :—

1. Varieties preserved for breeding work.
2. Older varieties produced prior to 1925.
3. Newer varieties produced in 1925, 1927, 1928 and 1929.

In addition, there are a number of varieties introduced from other countries, including several Java canes. The famous variety P.O.J. 2878 is being multiplied for distribution.

*Later limited to 85 families.

43. The first class is confined to those varieties which are not necessarily good commercial yielders but have proved themselves of great value in the production of seedlings on a scientific basis and are therefore used entirely as parent canes. These are being added to as data regarding performance for the purpose desired are secured. Studies carried out with the second class during the year, and after comparison with previous records, have enabled a selection to be made of 150 for further tests both at Sophia and on the estates. Many hundreds which were definitely inferior, have been abandoned. Unfortunately, all the varieties selected were only represented at the Station by small plots. Efforts are now being made to multiply these canes as rapidly as possible. The newer canes as represented in class 3 have also been subjected to very rigid selection which has greatly reduced their numbers to more workable proportions and in this class, excluding new seedlings raised at the end of 1929, there is now a total of 229 under observation and experimentation.

44. As a result of the above investigations to date, it seems safe to conclude that among the varieties 663/13, 683/13, 689/13, 695/13, 747/13, 814/13, 666/18, 835/18, 73/20, 203/20, 351/20, 557/20, 699/20, 636/21, 684/21, B.H. 10 (12), S.C. 12 (4) and Diamond 10 will be found canes which will prove worthy substitutes for, or supplementary to D 625—the present standard cane. An earnest endeavour is being made to work up these varieties in sufficiently large nurseries with a view to testing them in carefully planned trials in the various districts. As has been pointed out before, one of the hindrances in the past has been the distribution of too many imperfectly tested seedlings. In some cases, canes have been definitely lost to the Station as a result of this policy. During 1930, therefore, it is proposed to develop with the co-operation of the planters, a number of sub-stations for variety experiments on a scale commensurate with the staff and facilities available.

45. The Agronomist reports that during the arrowing season of 1929, a substantial beginning was made with hybridising on modern lines. This has necessitated careful observations on a large number of cane flowers, their character, periods at which they open, etc. ; thus a certain amount of night observation had to be carried out. In this work, special attention is being paid to the value of some of the hardy Java varieties in an effort to successfully cross them with our own local canes which have given satisfactory results. Sowings were made at the end of 1929 from over 20 different mother canes or crosses, and over 6,000 seedlings were basketed for transfer to the field in early 1930.

46. New fertiliser experiments have been initiated at Sophia and similar experiments have been laid down on some of the estates. This work will be increased in 1930, and maturity studies also inaugurated. Certain under drainage investigations are also in progress at Sophia, while several new cover crops and green manure plants have been introduced and are under trial.

47. The Station's staff has freely visited various estates and the necessary attention has been paid to the documentation and records at Sophia, while the Station was visited by the Committee and various planters during the year. Frequent visits to Sophia by all interested are very welcome, and the number of these, it is hoped, will increase during the coming year. The chemical work of the Station including analyses of the large number of plot samples was carried out by the chemical staff of the Department.

Experiment Stations, Demerara County.

48. The following is a summary, abstracted from the report of the Agricultural Superintendent, of the investigations prosecuted at the Rice Station, Georgetown, and at the sub-station "Cecilia."

49. *Rice.*—The work done may be considered, broadly, under the three following heads :—

(1) Growing single plant selections of each variety with a view to obtaining and/or maintaining a pure seed supply.

(2) Growing varieties, which have proved satisfactory for distribution purposes.

(3) Yield studies. As, however, when the station was re-organised no variety possessed characters which were standardised and uniform in type, extensive roguing was necessary during 1928 and 1929 ; little significance can therefore be attached to yield results obtained from such crops. Organised and persistent selection has now brought many of the varieties into a high degree of purity and varietal trials, in randomised blocks, will be carried out during the forthcoming crop. Results will be available in 1930.

Altogether, there were 50 varieties under observation, the following being introduced during the period under review :—

(*a.*) Mexican Edith (presented by Messrs. T. Geddes Grant, Ltd.), a variety imported in large quantities into Canada ;

(*b.*) Blue Rose, obtained through the Mount Royal Rice Mills Ltd., Montreal, and brought back from Canada by the Director ;

(*c.*) Peru, a purple awned variety, obtained through Mr. Grant, formerly of the firm of Messrs. Douglas and Grant.

50. The varieties in the single plant selection plots have been grouped according to periodicity of ripening and not according to their country of origin as had been previously done. This change has facilitated the recording and the comparison of observations. There was a well marked positive correlation in most of the varieties between early maturity and poor growth. Certain of the recently introduced varieties even flowered in the nursery, and when the seedlings were transplanted, the original flowering stems died ; flowering, however, recommenced approximately 4 weeks later. Tillering persisted in such varieties so that throughout the life of the plant there were heads in all stages of maturity. Continued selection and acclimatization work will be necessary with a view to eliminating such characters. Already, however, considerable progress has been made with the standardisation of many of the newer varieties under experiment, the most promising of which are :—

Carolina, Blue Rose, Lady Wright, and Mexican Edith from the U.S.A., C 14—31 and A 16—34 from Burma.

It is worthy of mention that a characteristic of most of the American varieties is the difficulty with which they are threshed and if and when these varieties are more generally extended the local use of mechanical threshers will, of necessity, demand attention.

51. The two varieties most extensively cultivated in the Colony are Demerara Creole and Blue Stick. Selection work on Blue Stick has been mainly concentrated on obtaining a strain that will ripen more evenly and not shatter so easily. By selection, Demerara Creole, decidedly the most promising variety under cultivation, has now attained a very high standard of uniformity in the following characters :—freedom from red and awned types, disease resistance, type of grain, stiffness of straw, and duration of cycle from sowing to ripening.

52. *Plantains.*—An experimental plot sufficiently large to permit 42 suckers being planted monthly for 12 months was selected and prepared. 21 sword and 21 bulb suckers were planted each month with a view to definitely determining, *inter*

alia, if and to what extent seasonal conditions would allow a less pronounced fluctuation than there is at present, in the supply of this vegetable. The Botanist is collaborating in this investigation.

53. *Bananas.*—There is a wide range of banana types being grown under observation, and on certain plots bananas have been grown for three years consecutively. A plot has been planted in the Gros Michel variety in order to make full notes on the size of bunch, height of tree and leaf growth in each successive generation. This experiment will indicate the period during which a soil type, such as that at the Experiment Station, may be expected to economically support a banana cultivation.

54. *Legumes.—Peas and Beans.*—Four varieties of pigeon peas were obtained from Barbados and Porto Rico and are under cultivation. A collection of peas and beans has been made and many are showing signs of promise. *Soya Beans.*—Of the varieties tried, Yellow Mammoth appears to be best adapted to local conditions where the soil is of a friable nature. The plots under this variety have been extended although it should be stated that on the heavy clay soils little hope can be held out for this crop. *Ground Nuts.*—The ground-nut trials were disappointing because of the extremely dry weather during August and September. The Virginia Bunch variety again gave the best results. *Green Dressings.*—A collection of these has been established. Bengal Bean has proved to be the most useful cover crop and seeds are being distributed as available.

55. *Vegetable Crops.*—Plots of onions, tomatoes, beet and cabbage have been maintained during the period under review in order to demonstrate the varieties best suited to local conditions. In respect to onions, the yield varied from 1,273 lbs. per acre on the clay soils at the Experiment Station, Georgetown, to 16,475 lbs. per acre on the sandy soil at Cecilia. The Bermuda onion grown from imported Teneriffe seed is the variety best adopted. In the case of tomatoes the variety Crimson Cushion has given consistently good results on the lighter soils, but tomatoes cultivated on the clay soils have not been encouraging as a commercial proposition. In respect to Beet, the Crimson Globe and Eclipse varieties are the best of those so far tried, while of the cabbages, Henderson's Succession is recommended. These crops produce the most satisfactory results when planted in the later months of the year as they reach maturity during the drier, cooler months of the following year.

56. *Forage Plants, etc.*—A collection of fodder plants is being gradually built up; Uba cane, Elephant grass, Guinea grass, Demerara Primrose have been grown and planting material distributed therefrom, some going to the Rupununi. The collection will be added to as planting material of other fodders is available. *Millets.*—These include Namudzi, an African Millet obtained from Nigeria through Kew, and which yields prolific grain crops ; an excellent food when made into meal, the stalks being used as forage. *Broom Corn* was also grown for seed as there is a small local demand for the brooms.

57. *Fruit Crops.*—Efforts to establish a citrus collection at the Georgetown Station have met with very discouraging results on account of the heavy low-lying nature of the soil. On the other hand, mangoes grow well and the collection of varieties is being added to. One acre has been recently laid out to the better known commercial sorts. This will provide material for further propagation of selected mangoes in the Colony. *Pineapples.*—15 varieties were tried at Cecilia and nurseries started with a view to distributing planting material of the most suitable varieties.

Agricultural Station, North West District.

58. The investigations at the Hosororo Station were continued and extended during the period under review while the Agricultural Superintendent has also

done a large amount of travelling and advisory work in the district with a view to stimulating agricultural effort. The more important crops and problems receiving attention are considered below.

Pegasse Lands.

59. *Coffee.*—As is well known, Liberian coffee is the main permanent crop of the district being specially adapted to the low peaty lands. A number of the better known varieties have been established in trial plots in comparison with *C. Liberica.* In addition, a start has been made with a large scale experiment of Liberian coffee to study the value of pruning versus non-pruning, economic control of Sclerotium disease and different systems of culture. One important difficulty has arisen, namely, the Chemist-Ecologist, after careful survey, considers that the pegasse land at Hosororo is not typical of the virgin pegasse of the district and it will be necessary to establish another experiment in a block of new land which it is hoped to secure nearby. Thus, results on both new and old pegasse will be secured.

60. The disease *Sclerotium coffeicolum Stahel* was not so much in evidence as in the previous year. The Mycologist and the Agricultural Superintendent are co-operating in a series of spraying experiments and other control measures on different farms ; useful data having been already obtained, farmers appear to be more alive to the necessity for taking action against this disease, the incidence of which varies annually, depending on weather conditions.

61. *Bananas.*—In an endeavour to ascertain what yields might be expected from Gros Michel bananas, under conditions in the district, plantings were made in November, 1928, over an area of about 7 acres. Up to the end of 1929 a total of 747 bunches were reaped, made up as follows :—

No of bunches.		*No. of hands each.*
1	...	...12
1	...	...11
13	...	..10
54	...	... 9
120	...	... 8
256	...	... 7
221	...	... 6
71	...	... 5
10	...	... 4
747		

the average weight per bunch being only 35.6 lb.

62. It will be seen that the number of bunches of nine hands and over amounts to 69. If the eight hand bunch is considered a count bunch—as a rule nine hands and over fall into this category—the count bunches out of a total of 747 would be 189 in number, or roughly 25 per cent. ; while 64 per cent. is made up of six and seven hand bunches. From good banana lands the reverse would be obtained.

63. It may be remarked that an operation which proved to be costly was the staking of the plants to prevent them from being blown over. Up to the end of 1929, $130.95 had been spent on cultivation, pruning, etc., of which the cost of cutting stakes, transporting, and staking amounted to $48.54.

64. *Ground Provisions and Vegetables.*—Experiments were carried out with yams and cassava and results given in the progress report which was published in the September, 1929, issue of the Agricultural Journal. As regards yams, considerably better returns were obtained where the plants were staked and this appears to be a profitable operation which is being further investigated.

65. Demonstration plots of onions, cabbages and Jerusalem artichoke were maintained and were of much interest to farmers. The artichoke yielded at the rate of 26,000 lbs. to the acre, providing an abundant return of edible tubers which make an excellent substitute for English potatoes. Any surplus may be profitably fed to pigs which relish them. Planting material has been distributed throughout the district, thus adding another useful food crop to those already cultivated.

66. *Miscellaneous.*—Small plots of Soya beans and various fibres were under trial during the period under review. Results to date have not justified further extension, but these observations are being continued.

Lateritic Hill Lands.

67. *Limes.*—The existing lime cultivation at the Station has been extended by 5 acres ; 2½ acres being established with plants budded on sour orange stock and 2½ acres with seedlings. This will enable data to be collected on the value, yields, etc., of selected budded plants compared with ordinary seedlings. Progress is being made with budding, some of the labourers at the Station being trained for the purpose ; budded plants will be available for distribution in 1930. The Agricultural Superintendent is encouraging the use of budded plants as these possess great advantages over seedlings.

68. *Citrus Fruit.*—The area which includes about 10 acres of the best varieties of selected grape-fruit and oranges budded on sour orange stock, continues to make satisfactory growth. This will provide material for extending the cultivation of commercial types throughout the Colony, apart from the actual value to the Station when the trees begin to fruit. A constant watch has to be kept for Coushi Ants which sometimes invade the cultivation from the neighbouring bush lands.

69. *Cacao.*—The Superintendent reports that the Cacao plants, grown from seed obtained by the Director of Agriculture, early in the year, from an old Dutch estate on the upper reaches of the Berbice River, are growing satisfactorily. A small extension of Cacao planting on the lower hill slopes has taken place in the district.

70. *Other Fruits and Spices.*—The selected varieties of grafted Avocadoes planted last year, are showing favourable progress. The different varieties of pine-apples which have been established grew slowly at first but manuring and mulching have resulted in a substantial improvement. These trials will be considerably extended on another portion of the Hosororo hill. A small area has been planted to grafted nutmegs, cinnamon, tonka bean, turmeric, ginger and Guinea pepper. Progress reports will be available from time to time.

71. *Poison Plants.*—In last year's report, mention was made of the efforts to collect and bring under cultivation the various plants of the Colony possessing insecticidal properties, notably the Haiaris. Progress was continued during the year and with the proposed grant from the Empire Marketing Board for the prosecution of these investigations, this work will be further extended. The Rothamsted Experimental Station, England, is co-operating with the Department of Agriculture in these studies.

72. *Forage Plants.*—There is great need in the North West for useful forage plants, if livestock rearing is to be successful. With this end in view, trials have been inaugurated with Elephant grass, Uba cane, Wynne grass and others. These are being added to as planting material becomes available at the Georgetown Station, where a collection of these crops is maintained.

73. *Windbreaks.*—On the hill clearings, suitable windbreaks of useful trees are being tried. A start has been made with British Honduras mahogany, seeds of which were obtained from Trinidad. Reports indicate that these trees are now in a very flourishing condition although having suffered somewhat from the attacks of the larvae of a pest which is being investigated by the Government Entomologist.

74. *Soil erosion.*—With the development of hill side agriculture, it is very essential that attention be given to the conservation of humus and the prevention of soil wash. This question has been receiving the necessary attention. Types of contour drains and wash pits have been dug while cover crops of various legumes and soil binding plants are being established. It is now very obvious that the haphazard clearings practised by the aboriginal Indians in the North West District have resulted in considerable soil losses. In many instances only a gravelly medium remains, the better soil shaving been completely washed away. If a permanent agricultural system is to be adopted on these hill lands, the greatest possible care must be taken to conserve the fertile soil.

75. *Wauna Sub-station.*—As a result of the extensive soil survey carried out by the Chemist-Ecologist in the district, it has become necessary to consider the utilization of the sand hills, of which there is a substantial area in this region for agricultural purposes. It is essential that a permanent agricultural system be devised if any scheme of land settlement is to be successful here. Accordingly, plans are being drawn up for experimental work on these soils, which are not represented at the Hosororo Station.

Agricultural Station, Essequibo.

76. During the period under review, it was possible to commence work on Henrietta Estate as an Agricultural Station where production of pure line seed of rice for the Essequibo District may be carried out on a substantial scale, while the "sand reef" will be utilised for experimental work on various crops suited to the lighter soils. Henrietta is part of the Anna Regina property which was purchased by Government in connexion with Colonization and Land Settlement developments. It embraces a total area of 346 acres, part of which has been cleared and fenced for the agistment of live-stock and to encourage cattle-breeding. Eventually, this Station will become an important distributing centre for agricultural information and exercise a stimulating influence on production throughout the county. Its importance to the Land Settlement activities nearby can hardly be exaggerated.

77. As the main irrigation and drainage canals had been neglected for about ten years, these were reconditioned immediately; the Intake Koker at the Conservancy was repaired and three plank weirs put down in the main irrigation canal. Various minor works were also executed. Ten acres west of the "sand reef" have been converted into padi beds uniformly laid out in blocks of one acre each. The first rice crop grown was of the Blue Stick variety, selected seed for which was obtained from the Georgetown Station. The crop reaped in the Autumn yielded 326 bags of padi of 140 lbs. each. Practically all of this seed was distributed to rice-growers in the district, a great part of it to farmers on the Anna Regina property. This estate had the reputation of producing a low grade of padi compared with that grown on the better known rice estates of the district. It is expected that the crops to be reaped in 1930, as the result of this pure seed campaign and the instructions given by the Agricultural Instructor to tenants, will be among the best, from which a trial shipment to Canada can be made. At the end of the year, preparation of beds for the Spring crop was in progress. Sowings will be carried out with selected seed from the Autumn crop.

78. The following is the estimated cost of cultivating an acre of padi in the district if hiring of oxen and ploughs is done:—

First Ploughing	$ 3 84
Second Ploughing	3 84
Levelling (Plank Method—oxen drawn) ...	96
Weeding before planting	1 92
Planting	2 40
Weeding after planting	1 92
Cutting	2 40
Threshing and Transportation	4 80
	$ 22 08

79. Essequibo has been now provided with an Agricultural Superintendent and it is planned that his activities will extend also to the Pomeroon.

ENTOMOLOGICAL INVESTIGATIONS.

80. Owing to the shortage of staff during the year, the Entomologist was called on to assist in various activities outside his usual line of work. In particular he assisted with the editorial work of the Agricultural Journal, acted for the Director of Agriculture during his absence in Canada and assisted in the preparation of certain memoranda for the Sugar Commission. Nevertheless, in spite of these additional duties, a fair amount of entomological work was carried out during the year which included the general routine upkeep of the Department's insect collections. The Department continues to receive valuable help from the Imperial Bureau of Entomology in the determination of specimens and in other ways.

81. *Sugar-Cane.*—The small Moth Borers, *Diatraea* spp., continued to receive attention and especially from the point of view of parasite control, the value of which was stressed by Dr. J. G. Myers of the Imperial Bureau of Entomology, who made a lengthy stay in the Colony and with whom the Entomologist collaborated very closely. Further reference to this visit and to the recommendations of Dr. Myers in connexion with the investigations which he considers should be carried out on this pest will be referred to in another part of this report. The actual losses in sugar yields which the Borers cause annually is difficult to state, but it is estimated that over 90 per cent. of all stalks of cane are injured to the extent of 25 per cent. of their joints.

82. The cane crop suffered both during the mid-year and during the rainy season from sharp attacks of the larger Hardback Beetle, *Dyscinetus geminatus* F. There were also outbreaks of the Small Hardbacks, *Dyscinetus bidentatus* Burm. It was noted that both insects occurred at the same time on one of the Golf Courses where they inflicted severe damage on the fairways. These pests appear to live for the most part in waste grass lands and periodically are capable of causing considerable damage to sugar-cane. The life history of these beetles is receiving close study. Flooding is one of the control measures recommended.

83. *Rice.*—The insect pests of this crop are being carefully watched in view of the increasing importance of the industry. During the year the Paddy Bug, *Mormidea poecila* Dall. continued to cause trouble in some districts while the small Moth Borer. *Diatraea saccharalis* F. was prevalent at times. The status of this latter insect in regard to rice is complicated by its presence in sugar-cane fields and this relationship requires to be thoroughly investigated.

84. *Coconuts.*—The investigations on the Coconut Stem Borer, *Castnia daedalus Cram.* were continued. It has been found that the life cycle of the insect occupies about a year. The habits of this insect render control measures tedious and somewhat expensive and the question of economic control is still under consideration. The Coconut Caterpillar, *Brassolis sophorae* L., was not reported as causing any serious damage during the year.

85. *Ground Provisions.*—Investigations were continued on the Tannia Beetle or " Cockle" (*Ligyrus ebenus* De G.) necessitating a special visit to the North West District by the Entomologist. Additional data have been secured and a full report will be published in due course.

86. *Silk Worm.*—Reports received from the Imperial Institute on the results obtained in this Colony are unfavourable and would not appear to justify further work being undertaken.

87. *Plant Protection Service.*—There has been a marked increase in activities under this head during the year. Inspection and fumigation of plant and seed

imports have been carried out where necessary. A Draft Bill has been prepared in conjunction with the Mycologist with a view to stricter legislation being enacted than exists at present for the prevention of insect outbreaks and the introduction of new pests and diseases.

88. *Sale of Insecticides.*—Arrangements were made during the year with a local firm for the supply of certain insecticides and fungicides to farmers and others at fixed prices. Ample publicity has been given to the subject in order that such chemicals as carbon bisulphide, important in the control of Coushi Ants—a common pest in the Colony—may be obtained at a reasonable cost.

BOTANICAL AND MYCOLOGICAL INVESTIGATIONS.

89. *Sugar-Cane.*—Most of the sugar estates in the Colony were visited during the year, but no serious fungal or bacterial diseases of cane were seen or reported. The two most serious infectious diseases affecting this crop in the West Indies, namely, Mosaic and Gumming Disease, have not appeared locally as yet but the former occurs in the neighbouring Colony of Surinam. To avoid their introduction, it is necessary that every precaution be taken in bringing any new varieties of cane into the Colony.

90. The principal disease of cane locally, is that known as "Root Disease," a name given to the withering and drying up of cane due to a poor development and functional failure of the root system, to be ascribed to environmental conditions rather than to the action of any definite organism. An unduly high proportion of Magnesium in relation to the Calcium in the soil would appear to be a contributing cause. No very serious outbreak of this trouble however appeared during the year. Minor diseases of cane included Ring Spot (*Leptosphaeria sacchari*) and isolated cases of temporary chlorosis.

91. *Rice.*—This crop is affected by no disease of importance.

92. *Coffee.*—In the North West District this crop is attacked by *Sclerotium coffeicolum*, an account of which has been published. This disease is controlled by spraying with Bordeaux mixture, and experiments have been inaugurated to test the efficacy of varying strengths of the mixture, and to discover whether this method of control, if successful, will prove economically advantageous. The outbreak of the disease during the period under review was comparatively mild.

93. *Coconuts.*—These are principally grown as a subsidiary crop, receiving very little attention in the way of cultivation. In addition, they are often planted on a heavy clay soil quite unsuited to them. It is under such conditions that "Wilt Disease," which is of common occurrence in the Colony, usually occurs. This disease appears to be entirely comparable with that occurring in Trinidad, where it has formed the subject of recent investigations. Although bacteria and fungi are found associated with the final stage of the disease, in which the crown of the tree dies and the heart rots, the inhibition of the proper functioning of the root system by adverse soil conditions is considered to be the primary cause. In addition to wilt a minor disease of the nuts themselves is commonly found, in which brown and discoloured areas appear on the surface. Beyond disfigurement however, little damage is caused, as the disease is only "skin deep." The cause of this appearance is so far undetermined.

94. *Plantains and Bananas* are principally affected by a wilt disease which has hitherto been ascribed as due to a species of Bacterium. As a result however of a visit to the Colony by Dr. Wardlaw, Banana Pathologist of the Imperial College of Tropical Agriculture, and following the investigations carried out by himself and the Botanist and Mycologist, this view has been somewhat modified. In addition to bacteria, diseased plantain and banana material have yielded strains of the fungus *Fusarium cubense*, the causal organism of Panama Disease. In his examination of Panama Disease in Central America and the West Indies, Dr. Wardlaw has drawn attention to the marked effect of soil and cultural conditions upon the

prevalence of the disease, and it is to be noted that the local wilt disease is especially to be found on badly drained soils and also where large stools have been allowed to develop over a period of several years, owing to failure to prune back all but a few suckers.

95. *Cocoa.*—Plantations on the Berbice and Demerara Rivers were all found to be infected with "Witch Broom" Disease, which has however not yet been observed among the few Cocoa trees in the North West District.

96. *Tobacco.*—The crop grown at the Experimental Station was affected by Mosaic Disease.

97. *Tomatoes.*—In various localities these were affected by "Blossom End Rot," a widespread disease wherever this crop is grown, and chiefly due to conditions adversely affecting the water supply. A wilt of Tomatoes at the Experimental Station was due to *Fusarium lycopersici.*

98. *Imperial Bureau of Mycology.*—Thanks are due to the Bureau for determinations of a number of fungi, and for the loan of literature unobtainable in the Department's library. In response to a request from the Bureau, a list of the known diseases of local economic crops was prepared and forwarded to them.

99. *Weed Eradication.*—The eradication of *Antidesma Ghesaembilla* from the Botanic Gardens has been continued and an account published of the costs of the operation and the methods employed.

100. *Investigation of Pastureland.*—A visit was paid to the Wiruni-Ituni Savannahs in September, and a survey made of the available pasture grasses, etc.

101. *Jenman Herbarium.*—Collections of plants were made from time to time, and a number of specimens despatched to Kew for determination; specimens were also sent to the New York Botanical Gardens. The general routine work of the Herbarium has been proceeded with during the year.

SOIL INVESTIGATIONS.

102. During the early part of the year, Mr. R. R. Follett-Smith, B.Sc., A.R.C.S., was appointed to the newly-created post of Chemist-Ecologist under the Colonization Scheme. This officer assumed duty on April 2, 1929, and left Georgetown on April 9 to carry out a soil survey of a certain area of the North West District in connexion with a scheme for the agricultural development of the interior. The final report was delivered on August 22, 1929. The area surveyed, roughly 156 square miles, consisted of 103 square miles of pegasse swamps, 40 square miles of sand hills and lateritic clay soils extending over an area of 13 square miles. On the score of drainage difficulties the pegasse swamps were ruled out of consideration as far as the suggested colonization scheme was concerned. Limited areas of virgin pegasse, occurring on the river banks where drainage is comparatively easy, will probably be empoldered and cultivated in the course of normal expansion. The lateritic clay type, of restricted occurrence, was to a considerable extent, already occupied. A large proportion of the remaining regions of this soil type occurred on the hillsides where the soil was so shallow, and the slope so precipitous that cultivation was out of the question. The immediate settlement of an agricultural community upon the relatively infertile sand hill soils was not possible and should not be undertaken until it can be proved that economic use could be made of such lands. A detailed survey of the Hosororo Experiment Station was also carried out.

103. A survey of the Waranama cattle ranch, Berbice River, was carried out during the period August 28 to September 4. A number of soil samples and collections of savannah grasses were obtained and subsequently examined in the laboratory. The soils consisted, mainly, of an acid sand, deficient in lime, phosphate, potash and organic matter. The grasses of the savannah, all of a xerophytic type, were markedly deficient in essential minerals. The improvement of the pasture

grasses by manurial treatment would probably prove uneconomic. The regular administration of bone meal was suggested as the most promising method of rectifying the more important mineral deficiencies of the savannah grasses.

SPECIAL INVESTIGATIONS.

104. *Sugar Commission.*—Reference was made in paragraph 13 to the acute crisis through which the sugar industry is passing. As is well known, the Secretary of State appointed a Commission headed by Lord Olivier to enquire into the whole economic condition of the industry in this and other Colonies. The Commission arrived on November 16 and left on December 2, during which time evidence was taken from all those engaged in the industry, officers of the Department and others. The Director accompanied the Commission on all important tours, while various memoranda were prepared and submitted for the purpose of the enquiry. It is too early to say what the general result of this enquiry will be, but there can be no doubt that it has provided a stimulus to greater co-operation among those engaged in sugar production. The need for more research on problems affecting the industry was stressed but this, it was pointed out, could not be accomplished with the existing appropriation. Great interest was evinced in the efforts being made to settle peasants on the land, and the visitors were much impressed by the Bush Lot Land Settlement Scheme. The importance of the rice industry was apparent to the Commission especially in the present difficult plight of sugar; the steps being taken to improve and stabilise this industry were fully explained.

105. *Oxford University Scientific Expedition.*—The Expedition spent 17 weeks in the Colony for the purpose of carrying out certain biological investigations in the forest zone. The Expedition was afforded the facilities of the Jenman Herbarium while the Government Botanist also joined the party for a short time on the Moraballi Creek, Essequibo, where botanical collections were made. The material obtained will be a valuable contribution towards the compilation of the proposed Flora of British Guiana.

106. *Visit of Mr. C. E. Douglas, M.I. Mech. E.*—As a result of Government representations, the Empire Marketing Board provided funds to enable Mr. Douglas, who is a recognised authority on the industrial side of rice production, to visit the Colony and report on the various problems of the industry and the steps which should be taken to improve conditions. Mr. Douglas arrived in the Colony on October 30 and left on November 30, and during his stay the Department provided him with every facility for prosecuting his investigations. Members of the staff accompanied him on all tours. It is expected that this visit will be most helpful especially as regards improvements in cleaning, milling and marketing.

107. *Trade Mission to Canada.*—The Director of Agriculture, as a result of recommendations made by the Chamber of Commerce, undertook a special trade mission to Canada on behalf of Government. He left Georgetown on July 15 and returned on November 1. While in Canada he interviewed a large number of persons interested in the products of the Colony. First-hand information was secured in regard to increasing trade possibilities, notably in rice, although other commodities received attention equally. A full report of the Director's activities in Canada, including efforts to advertise the Colony and interest Canadians in its potentialities, was published as Sessional Paper No. 1 of 1930. The report has been widely circulated and should prove of great value in future trade relations with Canada.

108. *Visit of Dr. J. G. Myers, M.Sc., (N.Z.), Sc. D. (Harv.).*—Dr. Myers, who is attached to the Imperial Bureau of Entomology, is an authority on the parasitic control of insects. Through the courtesy of the Empire Marketing Board he visited the Colony in special reference to the problem of Moth Borers attacking sugar-cane. He arrived in the Colony on March 8 and left on June 17; Mrs. Myers accompanied him as collaborator. During his stay here, Dr. Myers attached

himself to the Department and his whole programme was arranged and executed in close co-operation with Mr. L. D. Cleare, Government Entomologist. It should be stated that Dr. Myers is making a complete survey of conditions in respect to the parasitic control of insect pests in the entire Caribbean region, with the Imperial College of Tropical Agriculture his headquarters. The Colony is greatly indebted to him for assistance and advice in respect to the most important economic pest in the Colony, namely, Sugar-cane Moth Borers. These Borers unfortunately do not confine their attention to cane stalks but are also capable of causing injury to rice ; the general status of the pest is complicated by its existence not only in cane and rice but also in certain grasses. One immediate result of this visit has been a request for further assistance from the Empire Marketing Board for help in the carrying out of investigations which are essential to the clearing up of the whole position, leading to more efficient control of the pest. The following note by Dr. Myers explains very clearly the investigations that should be undertaken :—

> "Under present conditions in British Guiana there is only one really serious insect pest of sugar-cane and that is *Diatraea*. But infestation by this borer is higher in British Guiana than in any other country we know of.
>
> "Enough is now known about this insect to show conclusively that if this is to be regarded as a problem to be solved once and for all, rather than as a permanent nuisance to be mitigated by mere *ad hoc* and partial methods, fundamental research is necessary into every phase of *Diatraea* ecology. I feel confident that even three years of such investigation as that outlined below would bring us measurably nearer to a final solution ; provided that a first-class entomologist with the necessary ecological outlook be appointed and that he be given full time facilities for research and complete freedom from routine administrative or advisory duties. I would suggest that the appointment be for three years in the first instance. If definite results of substantial economic value, with promise of more, were not forthcoming at the end of that period I should regard it as an indication that the investigation was proceeding on the wrong lines.
>
> "The necessary ecological work may be considered under two main headings—(*a*) physical and chemical, (*b*) agricultural and biological.
>
> *Physical and Chemical Ecology.*—I envisage an investigation on similar lines to that of the Froghopper Committee in Trinidad, with this difference, that under Trinidad conditions all the physical and chemical measurements, surveys and soil analyses were carried out purely for the purposes of the froghopper investigation, whereas in British Guiana, with an active and fully-staffed Department of Agriculture in process of organisation, much of the more fundamental work of this type would be accomplished in any case and without special reference to *Diatraea*. It would be the duty of the *Diatraea* investigator to apply the general data thus acquired to his own special problems, to correlate them with borer surveys and to supplement them where necessary. For this reason it is not yet practicable to suggest anything like a detailed programme under (*a*).
>
> (*b*) Since work under (*a*) depends on the progress of general soil and other surveys by the department as a whole, it will necessarily take some time; and the *Diatraea* investigator would therefore concentrate, at least for the first two years, on the purely agricultural and biological aspects.
>
> "1. *Agricultural Ecology.*—The whole of the processes in cane and rice-growing ought to be studied from the point of view of their effect on the borer and on its parasites. This investigation should strenuously avoid mere expressions of opinion, and should base its results on exact quantitative studies of borer infestation and of rate of parasitism at various stages in the growth of the crop.

"Much has been written on the bad effect the burning of fields before cutting is said to exert on the parasites—especially on egg-parasites. This depends largely on the rate of effective parasitism; and no statement made on our present knowledge is much more than a pious opinion. It is essential to obtain exact numerical data.

"In addition to ordinary agricultural operations, there is at present a very considerable amount of money spent on *ad hoc* measures against the borer. Most estates have at least a borer gang, but some have not, and it is significant that there seems no substantial difference in infestation. It would appear that where the rate of parasitism is below 50% (and it is usually very much less) the collection and destruction of borers is a sound measure; but in the absence of exact figures as to what *proportion* of the existing borer and parasite populations is destroyed, we are really working in the dark.

"Then again there is the question of weed-grasses, both on the dam beds and in the canals. Many of these harbour the borer, but in many if not all, the rate of parasitism is much higher than it is in the cane. Several species of parasites which do not attack the borer in cane, parasitise it in these grasses, the flowers of which, moreover, are extremely attractive to several of the adult parasites. This example is given to show the extreme complexity of the problem, and the need for studying *Diatraea* not only in the two main crops which it attacks, but in its wild hosts and original habitats too.

"2. *Biological Work.*—There are three main species of *Diatraea* attacking cane in this Colony. These have numerous subsidiary host-plants and are attacked by a large number of different kinds of parasites. It is a striking and significant fact that whereas the infestation of borers is markedly even throughout the Colony, the rate of parasitism by different parasites varies tremendously from one estate to another—so much so that if all the parasites exerted anywhere near their maximum effect on all estates together, the *Diatraea* problem would cease to exist.

"My own contribution to the work will lie in the introduction into British Guiana of *new* parasites, which at the worst, will merely serve to supplement the work of the native ones, and at the best may lead to reduction of the borer below pest level.

"The biological work needed in this country is threefold: firstly, to work out in detail the complex interrelations of *Diatraea*—plant-host-parasite, outlined above, and to study the effect of the agricultural operations on this balance; secondly, to devise ways and means of assisting artificially the work of the parasites already here; and thirdly, to assist in the establishment of the foreign parasites, introduced by me. In the encouragement of native parasites, it is experiment on a large scale which is needed. The aim should be, especially with the egg-parasites, to secure a rearing and liberation of at least a million a day, and to concentrate this total on a small area where demonstrable, substantial and unequivocal results can be expected. When such results can be shown, there will probably be no difficulty in securing the adoption of this technique on all the estates. The cost should be very little more than that already spent on several estates which now keep their own laboratories but do not rear sufficient numbers of parasites to obtain a really marked effect on infestation.

"An effort should be made to breed the larval parasites as well, on a very large scale. This is a promising line of work provided the necessity for prodigious numbers be borne in mind."

109. *Visit of Dr. C. W. Wardlaw, Ph.D., D.Sc., F.R.S.E.*—Dr. Wardlaw is Banana Pathologist attached to the Imperial College of Tropical Agriculture for special research on banana problems. Here again, the Empire Marketing Board is contributing substantially to the investigations being carried out. Dr. Wardlaw's studies have taken him to the important banana-growing countries of the Central American region including Jamaica and Surinam. He visited this Colony with a view to advising on the possibilities of establishing a banana industry. The Botanist and Mycologist assisted Dr. Wardlaw and accompanied him on various tours. As a result of his observations elsewhere and after studying soil and other conditions here, Dr. Wardlaw expressed the opinion that little hope can be held out for a large scale remunerative banana industry with the Gros Michel variety—the existing banana of commerce. He, however, approves of the variety trials and other banana experiments at present conducted by the Department. Dr. Wardlaw's findings will have been published before this report is printed ; these confirm generally the opinions hitherto expressed.

110. Other important visitors during the period under review included Mr. Karl Walters, Secretary of the Horace Plunkett Foundation, who visited the Colony with a view to obtaining information on agricultural co-operation ; Mr. A.M. Estabrook of the International Institute of Agriculture, Rome, which Institute is endeavouring to secure a complete Census of world agricultural production ; Colonel H.M. Wallis of the Mount Royal Rice Mills, Limited, Montreal, who accompanied the Director on his return from Canada in order to examine the possibilities of trade in padi for the milling of white rice in Canada.

AGRICULTURAL EDUCATION AND EXTENSION.

111. *District Instruction.*—As mentioned in last year's report, every effort is being made to bring the department more in touch with agriculturists. Reference was also made to the shortage of district agricultural staff. This shortage it is hoped will be rectified to some extent during 1930 with the appointment of a responsible District Officer for each County who will gradually train a small staff of Agricultural Instructors to co-operate with him. With the progress being made in the establishment of an Agricultural Station in each County, propaganda and advisory work will be pushed forward. These Stations are essential to the success of such work which requires a little time to be efficiently organised. It means a careful building up of field experiments, agricultural committees, farmers' organisations and co-operative credit societies. It is true there are a number of Agricultural Associations in existence but only one or two at the most are functioning in a satisfactory manner. Extension work, as outlined, will have to be fostered and developed step by step.

112. It is now recognised that one of the primary needs of village agriculture in the Colony is a definite agricultural practice by which farmers will be guided in the pursuit of their livelihood. At present, no system exists involving economic use of livestock and crop rotations, so that, from this point of view, village agriculture must be given a fresh start and an end put to haphazard wasteful use of land. Drainage and irrigation problems still persist in many places and constitute a drawback to the growth of crops less tolerant than those usually grown, while often seriously compromising the yields of those best suited to the conditions, namely, sugar and rice. As was the case last year, the greater part of the district activities on the coastlands centred on rice propaganda, including selected seed campaign, and this work is yielding encouraging results.

113. The Experiment Stations at Georgetown and Cecilia, in particular, have been visited by farmers, school children and others, and a certain amount of interest displayed in the work being carried out There is room, however, for much more frequent visits on the part of agriculturists and the general public to view the investigations in progress ; further efforts to achieve this end will be made. The staff at headquarters made regular tours in the various districts and also attended

to special requests for advice and assistance when required. These requests are increasing and indicate a growing appreciation of the necessity for frequent visits to the outlying centres by the Specialist Officers. Success of extension work depends on the ability of the staff to travel freely, and undue restrictions in this connexion are a false economy.

114. *Exhibitions and Competitions.*—The West Bank Farmers' Agricultural Associations held a joint Agricultural, Livestock and Industrial Show at Bagotville Anglican Schoolroom on Wednesday, August 21, under the auspices of the Department. In the absence of His Excellency the Officer Administering the Government, through the pressure of official business, the Honourable A. V. Crane, LL.B., Member of the Legislative Council for West Demerara, opened the Show. There was a variety of fruit, vegetables, economic products and livestock on exhibit as well as displays of needle and fancy work.

115. A special feature of the Show was the attractive stand of the Department, the principal displays of which were padi and rice showing types suitable for West Indian and Canadian markets, also budded fruit plants. Officers of the Department were present and gave suitable talks and demonstrations to visitors.

116. A Farmers' Competition was again held in the North West District this year. Prizes to the value of $120 were awarded for the following :—

1. Young Coffee—not less than 2 acres.
2. Established Coffee—not less than 2 acres.
3. Stock (*a*) best boar, sow or barrow ; (*b*) best pair of sheep, ram or ewe (*c*) best pair goats ; (*d*) best cow or heifer.
4. Best kept and most sanitary house and surrounding ; also best all-round farm.

117. A successful Farmers' Competition was also held on the Corentyne Coast of Berbice for rice cultivations. On the whole the cultivations were good and the strains of padi fairly pure. Awards totalling $50 were made. During 1930, Competitions will be considerably extended, as it is felt that under existing conditions, improvement in field methods is of first importance.

118. *Agricultural Associations.*—Three Associations received affiliation grants of $25 each during the year.

119. *Agricultural Courses.*—The usual work connected with the training of apprentices has been continued at Georgetown during the period under review. In addition to this, a short course of lectures with practical classes was given a number of teachers of the Training Centre by officers of the Department at the experimental fields and Botanic Gardens nurseries. Examinations were held and results forwarded to the Education Department. It should be stated that the problem of School Gardens as associated with the development of Home Gardens is being considered with the Education Department. A scheme to this effect will be submitted to Government in 1930.

LIVESTOCK.

120. *Stock Farm.*—In the last Administration Report it was mentioned that 32 acres of land adjoining D'Urban Park and the Experiment Station, Georgetown, had been allotted to the Department for use as a small stock farm. The farm has now been divided into paddocks. A cow stable, designed to serve as a demonstration to farmers interested in dairying, was built. The chief features of this stable are that it is not costly, is cool and sanitary ; three portable pig-houses and a store house for food were also built and poultry and pig runs erected.

121. Fodder crops and shade trees have been planted ; among the former the most promising results were obtained with Demerara Primrose (*Asystasia scandens*). The fodder plants found growing naturally have proved, in practice and analysis

to be deficient in phosphate, calcium and nitrogen, with the single exception of the Demerara Primrose. The indications are that the farm pasture will maintain working oxen in good condition but it is not good enough for milch cows and young stock which require supplementary rations. It, however, cannot be doubted that there is better pasture in certain areas of the coastal belt than there is at the Stock Farm. Locally-grown foodstuffs which might be made up into balanced rations for cattle and pigs are costly and obtained with difficulty. Imported foodstuffs, although cheaper than local produce, are expensive. A mineral ration has been fed to all stock on the farm and the condition of the animals and poultry has justified their use.

122. *Breeding Stock.*—Reference has been made previously to the steady depletion which had been taking place in the Government Stud animals. During the year only one stud donkey gave satisfactory service. Two young Fresian bulls were imported from Canada with a view to increasing the number of these pedigree bulls at stud in various districts of the Colony. Two sows and a boar of the Berkshire breed were also imported from Canada and the boar is now at stud for selected pigs. A pen of eight young white leghorn pullets and one cockerel were obtained from Barbados. Births during the year were : two Fresian bulls, a litter of ten Berkshire pigs. Deaths during the year were : one jack donkey, one young Berkshire pig.

123. *Diseases.*—There are few contagious and infectious diseases of animals in the Colony as compared with other stock raising countries. Two outbreaks of Anthrax occurred in the Mahaicony District. It is probable that the source of infection was the same for both outbreaks but it was not possible to maintain the quarantine over such a large unenclosed area. The best that could be done was to quarantine the places on which cattle died and order the inoculation of the animals belonging to those places. Anaplasmosis, a blood disease transmitted by ticks, seems to be contracted by most imported cattle ; the disease, however, appears not to be dangerous, provided that the sick animal receives prompt attention. Investigations indicate that many of the extremely emaciated animals seen on the savannahs suffer from internal parasites.

124. *General.*—In his remarks on Animal Husbandry the Veterinary Surgeon points out that the management of stock, locally, is primitive. Horses, mules and donkeys receive a certain amount of attention but cattle and small stock, are, as a rule, left to fend for themselves. In order to arouse interest in livestock, it is essential to have a Government Stock Farm which can supply good foundation stock to farmers. The system of sending stud animals to different districts is proving unsatisfactory as considerable expense is entailed and few stock-owners apply for service. The most expeditious method of improving the local types of cattle, the export of which ought to be a major industry, is to provide fixed centres for the stud animals and in their neighbourhood provide reasonable facilities for the grazing of carefully selected female animals. This policy can be carried into effect at the Agricultural Stations which are being gradually organised. Even a very limited number of graded herds scattered throughout the Colony would help to create an interest in cattle rearing. It is emphasised that the breeding of pure-bred animals by the Government should be on a larger scale.

125. An attempt was made during the year to establish Veterinary Clinics, at which peasant stock-owners could register their names and addresses if they desired veterinary assistance or advice ; village offices were considered as the most suitable centres at which to keep registers. For several months periodical visits were made by the Veterinary Surgeon but these have been temporarily suspended as little interest was shown by stock-owners.

126. An investigation of ranching problems was carried out in the Waranama district in company with the Chemist-Ecologist and Botanist.

127. The old ordinance dealing with livestock regulations and control of diseases has been revised and brought up-to-date and now awaits legislative sanction.

128. The returns of livestock in the Colony during 1929 are given as under :—

Horses	...	...	...	3,702
Asses	...	...	...	7,169
Mules	...	...	...	1,691
Horned Cattle	...	...	...	153,639*
Buffaloes	...	...	...	367
Sheep	...	...	...	26,695
Goats	...	...	...	15,825
Swine	...	...	...	22,811

BOTANIC GARDENS AND NURSERIES.

129. *Ornamental Section.*—Further progress was made with the re-arrangement of the different shurbs when weather permitted transplanting. Massed beds of Crotons, Acalyphas, Eranthemums, Lagerstromias, Gardenias, Petreas, Spireas, Plumbago, Hibiscus, etc., are now to be seen, the effect being more noticeable in the southern section of the Gardens. A number of new introductions have been also tried out. In the park lands, the ornamental trees put out last year are now coming into prominence, notable *Cassia* spp. The lilies too have been extended, the new red lily trench on the south side of the main drive being very striking. It has been possible to label the more important trees, the labels being specially imported from England. The names, both scientific and common, with places of origin, are given. The effect is both pleasing and useful. Lawns and roads have received the usual attention and the former, in particular, have shown considerable improvement during the last two years. The Gardens have been established just 50 years, and in their newly improved condition, continue to be a source of great attraction to tourists, while the local inhabitants exhibit great pride in them. Negotiations are proceeding with a view to having existing irrigation facilities improved by connecting up the Gardens with the City Waterworks' mains. This should provide a regular supply of water during the dry season, at the same time eliminating the inefficient hand methods of watering which have been practised all these years. Government House and other Government gardens and grounds have been supervised as usual.

130. *Nurseries.*—The nurseries and plant houses have been kept fully stocked during the year. The plant tables which were in a dilapidated condition have been renovated. A number of the orchids, profiting from the rebasketing to which they had been previously subjected, flowered during the year.

131. The value of the economic section has been greatly enhanced by the increased activities in respect to the propagation of selected fruit plants, notably budded citrus. At the end of the year, preparations were in progress for the sowing of several thousand seedlings for stock purposes. The value of receipts for sales in this section increased by $110 over the preceding year. Considering the low prices charged, this must be regarded as satisfactory. Indeed, the number of economic plants distributed more than doubled that of 1928.

SEED AND PLANT DISTRIBUTION.

132. The following is a list of the planting material distributed locally by the department during the year :—

*Of these 72,508 are in the Hinterland Savannahs.

Field and Garden Crops.

Sugar-cane	...138,000 cuttings.
Rice padi	... 75,242 lbs.
Bananas	... 426 suckers.
Bengal Beans ...	... 325 lbs.
Ground nuts ...	... 14 lbs.
Soya Beans ...	... 181 lbs.
Pulses (various) ...	... 20 lbs.
Broom Corn ...	... 49 lbs.
Millet	... 15 lbs.
Tobacco	... 1 lb.
Onion	... 28 lbs.
Tomatoes	... 3 lbs.
Cabbage	... 2½ lbs.
Fodders (various) ...	... 3,000 cuttings.

Orchard Crops.

Coffee	... 6,786 seedlings.
Cacao	... 1,578 seedlings.
Budded Citrus ...	... 402 plants.
Papaw	... 461 seedlings.
Soursop	... 244 seedlings.
Sapodilla	... 283 seedlings.
Miscellaneous fruits ...	... 748 seedlings.

SEED AND PLANT EXCHANGE.

133. During the year a number of valuable introductions were made, including material of both economic and ornamental plants. Complete details of nomenclature, quantities and places of origin have appeared regularly in the Agricultural Journal under the heading of "Plant and Seed Importations." Special mention must be made of the assistance Kew continues to give in this connexion, and also of the aid received from the Trinidad Department of Agriculture especially as regards citrus budwood. Contributions from the Department have been sent to: Barbados, Trinidad, Ceylon, France, Russia, Washington (U.S.A.), South Africa, Dar-es-salaam (East Africa), Egypt, Gold Coast, Tucuman (Argentine), New South Wales (Australia).

PUBLICATIONS.

134. The "Agricultural Journal of British Guiana" is published quarterly by the Department, and has a circulation of approximately 1,000. The articles published of necessity cover a wide range of subjects as a Journal of this type must, *inter alia*, endeavour to perform the following functions:—

(*a.*) To be a useful aid in passing on information to local agriculturists, traders, technical workers on sugar estates, and the general public;

(*b.*) To record, for reference purposes, results of investigations (in field and laboratory) carried out by officers of the Department;

(*c.*) To serve as a means for reciprocating ideas and information between the workers in this and other Agricultural Departments.

Many of the more popular contributions were reprinted in leaflet form for free distribution. Among those which have appeared in this way are:—"Soya Beans"; "Black Eye Peas"; "Capons"; Rototilling Cane at Plantation Blairmont"; "A Preliminary Study of the Coffee Industry"; "A Method for the Rearing of Egg Parasites of the Sugar Cane Moth Borer." Progress reports of departmental activities are also a feature of the Journal, the subscription for which is two shillings per annum post free.

135. In addition to the above, Agricultural Notes compiled by the Department of Agriculture, have appeared from time to time in the local press. Only popular

subjects likely to be of local interest are dealt with and it is hoped that a useful purpose is thereby served in that the information printed in the columns of a newspaper is conveyed to a much greater section of the community than that subscribing to and reading the Agricultural Journal. Contributions have been made by the Director to the Chamber of Commerce (principally in connexion with the rice industry), while a paper entitled "Butterfly Migration in B.G." II. was submitted to the Entomological Society of London by the Government Entomologist.

GENERAL REMARKS.

136. The agricultural situation from the point of view of production can be regarded as satisfactory when compared with that of previous years. Unfortunately, low prices ruled for practically all products. Rice, as will be seen, continues to show a marked increase. Since it is a crop, like sugar, highly tolerant to the peculiar soil and climatic conditions of the Colony, there should be a great future for the industry locally. The Department will continue to exercise strenuous efforts towards this end. In certain quarters, the value of rice as an industry is not fully appreciated. Some appear to think that the Colony can produce, for export, fruits and other commodities which are best adapted to higher and better drained lands. To concentrate on such crops for export, at the outset, would be to waste time, money and labour. Doubtless, a certain quantity can be and should be grown, in the first place, for local consumption. Extensive trials to this end are in progress as will be judged by the work at the North West Station. Future soil surveys may indicate where the planting of these crops on a large scale can be recommended, but such areas cannot be said to be available at present in the existing cultivated parts of the coastal belt.

137. Coconuts and coffee also have their place and can be increased advantageously, while the livestock industry, hitherto almost entirely neglected is clamouring to be given a fair opportunity. Funds for the study of livestock problems and the maintenance of a model farm on a reasonable scale are seriously needed. On present lines, progress is too slow to be noticeable.

138. Reference to last year's report will show that certain essential requirements were foreshadowed in the way of staff and laboratory accommodation. In the 1930 estimates, provision was made for the appointment of two additional Agricultural Superintendents, one for Berbice and one for West Demerara; also during 1930, a division of agricultural chemistry will be organised under a well-qualified research chemist. Soil survey work will be a special feature of this division. The building accommodation of the Department still continues to cause anxiety; the present headquarters' offices and laboratories are not only in a dilapidated condition but are very congested.

139. The success of the Department depends on the facilities provided for a thorough study of the fundamental factors affecting crop production in the Colony. Agricultural methods and practice cannot be revolutionized nor can all the problems awaiting solution be tackled at once. Since crops and stock will go through their cycle and cannot be hurried, so only by patience and perseverance can there be evolved that era of prosperity which follows inevitably as a result of strong and permanent foundations well and truly laid.

140. In conclusion, I should like to express my appreciation of the loyal help rendered by the staff during the year. Also, the thanks of the Department are due to sugar planters, the mercantile community and others for willing assistance rendered at all times when called upon.

J. SYDNEY DASH,
Director.

July 24, 1930.